WHAT IS CLAIMED IS:

1. A system for retaining a silicon wafer during semiconductor processing and subsequently releasing it, the system comprising:

a chuck equipped with a lifting mechanism, wherein the chuck is dimensioned to receive the wafer and the lifting mechanism is adapted to release the wafer from the chuck;

a voltage source operably coupled to the chuck, and adapted to impart an electric charge to the chuck and an opposite electric charge to the wafer, producing an electrostatic attraction between the wafer and the chuck;

a sensor adapted to measure a force due to the electrostatic attraction, wherein said force is in opposition to the lifting mechanism;

a control system adapted to neutralize the electrostatic attraction between the wafer and the chuck by reversing the polarity of the voltage source, reducing the first and second electric charges until the force opposing the lifting mechanism reaches a predetermined minimum, as indicated by the sensor.

2. The system as recited in claim 1, wherein the lifting mechanism comprises at least one extendable lifting pin driven by a solenoid.

3. The system as recited in claim 2, wherein the sensor comprises a load cell adapted to measure the force opposing the lifting mechanism and to forward the measured force to the control system.

4. The system as recited in claim 2, wherein the sensor comprises a current monitor adapted to measure the solenoid current and forward the measured current to the control system.

5. The system as recited in claim 2, wherein the control system is further adapted to limit the current to the solenoid until the force opposing the lifting mechanism reaches a predefined minimum, and then to increase the current to the solenoid to enable the lifting mechanism to raise the wafer off the chuck.

6. The system as recited in claim 1, wherein the lifting mechanism comprises at least one extensible lifting pin driven by a pneumatic or hydraulic pressure-actuated piston.

7. The system as recited in claim 6, wherein the sensor comprises a pressure sensor adapted to measure a pressure equivalent to force opposing the lifting mechanism and to forward the measured pressure to the control system.

8. The system as recited in claim 7, wherein the control system is further adapted to limit the pressure to the piston until the pressure opposing the extensible lifting pin reaches a minimum, and then to increase the pressure to the piston to enable the lifting mechanism to raise the wafer off the chuck.

9. The system as recited in claim 6, wherein the sensor comprises an orifice at an interface between the wafer and the chuck, operably coupled to the chuck are:

a line through which pressure may be applied to the wafer through the orifice; and

a sensor adapted to indicate to the control system the presence or absence of pressure at the orifice.

10. The system as recited in claim 9, wherein the control system is further adapted to limit the pressure to the piston until the pressure at the orifice is absent, and then to increase the pressure to the piston to enable the lifting mechanism to raise the wafer off the chuck.

11. A method for releasing a semiconductor wafer, comprising:

sensing electrostatic attraction between a wafer and a chuck electrically charged opposite one another;

neutralizing the electrostatic attraction by reversing the electrical charge applied to the wafer and the chuck; and

when the sensed electrostatic attraction achieves a pre-determined minimum, lifting the wafer from the chuck.

12. The method as recited in claim 11, further comprising:

placing the wafer on the chuck; and

charging the wafer and chuck opposite one another.

13. The method as recited in claim 11, wherein said lifting comprises extending a pin against a backside of the wafer.

14. The method as recited in claim 13, wherein said sensing comprises reading a pressure of the pin against the backside of the wafer prior to lifting the wafer.

15. The method as recited in claim 13, wherein said lifting comprises driving a solenoid coupled to an extendable pin.

16. The method as recited in claim 15, wherein said sensing comprises measuring current in the solenoid needed to oppose downward force of the wafer against the extendable pin prior to lifting the wafer.

17. The method as recited in claim 16, further comprising limiting the current until the force of the wafer reaches a minimum, and then increasing the current to enable lifting the wafer.

18. The method as recited in claim 11, wherein said lifting comprises pneumatically driving a pressure-actuated piston bearing against a backside of the wafer.

19. The method as recited in claim 18, wherein said sensing comprises sensing the pressure within the pressure-actuated piston during times when the piston bears against the backside of the wafer.

20. The method as recited in claim 19, further comprising limiting the pressure within the pressure-actuated pistons until the pressure brought to bear against the pistons reaches a pre-determined minimum, and then increasing the to the pistons to enable lifting the wafer.

21. The method as recited in claim 18, further comprising reading a pressure at an orifice configured at the interface between the wafer and the chuck.

22. The method as recited in claim 18, further comprising limiting the pressure to the piston until the pressure at the orifice is absent, and then increasing the pressure to enabling lifting the wafer.